

<https://youtu.be/vN-4fqGKZuc>





JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

KIDS INSPIRING KIDS IN STEAM!

www.kiks.unican.es



Erasmus+

EXPERIENCE WORKSHOP



THE EXPERIENCE-CENTERED
MATH/ART MOVEMENT
www.experienceworkshop.org



Co-funded by the
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Experience Workshop's STEAM Learning Material

4Dframe SNOWFLAKES

Dr. Kristóf Fenyvesi
University of Jyväskylä



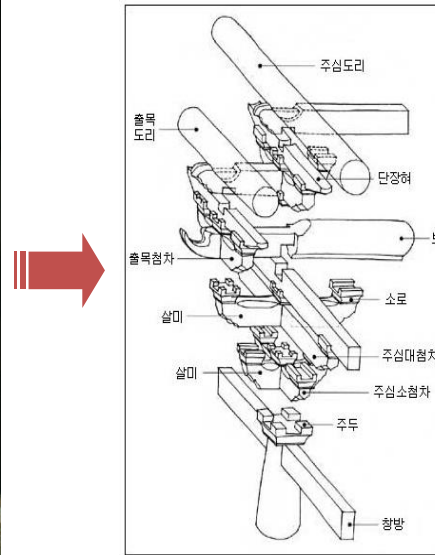
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The Brand : 4D Frame

- ❖ The 4Dframe educational modelling kit is based upon the analysis of building techniques utilized in the construction of Korea's traditional, wooden buildings, in which no any nails have been used.
- ❖ 4Dframe has been proved to be a very appropriate tool for developing various skills in the transdisciplinary framework of STEAM learning.



Traditional Korean Wooden Palace



Principle of Architecture



4D Frame Tube

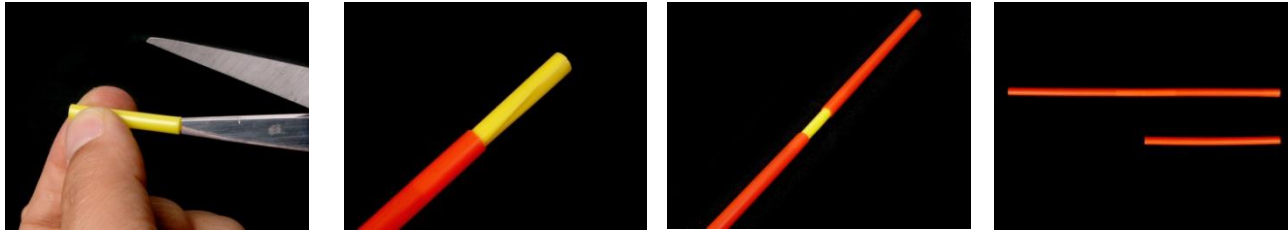


4D Frame Connector

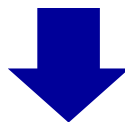
Character : Flexibility



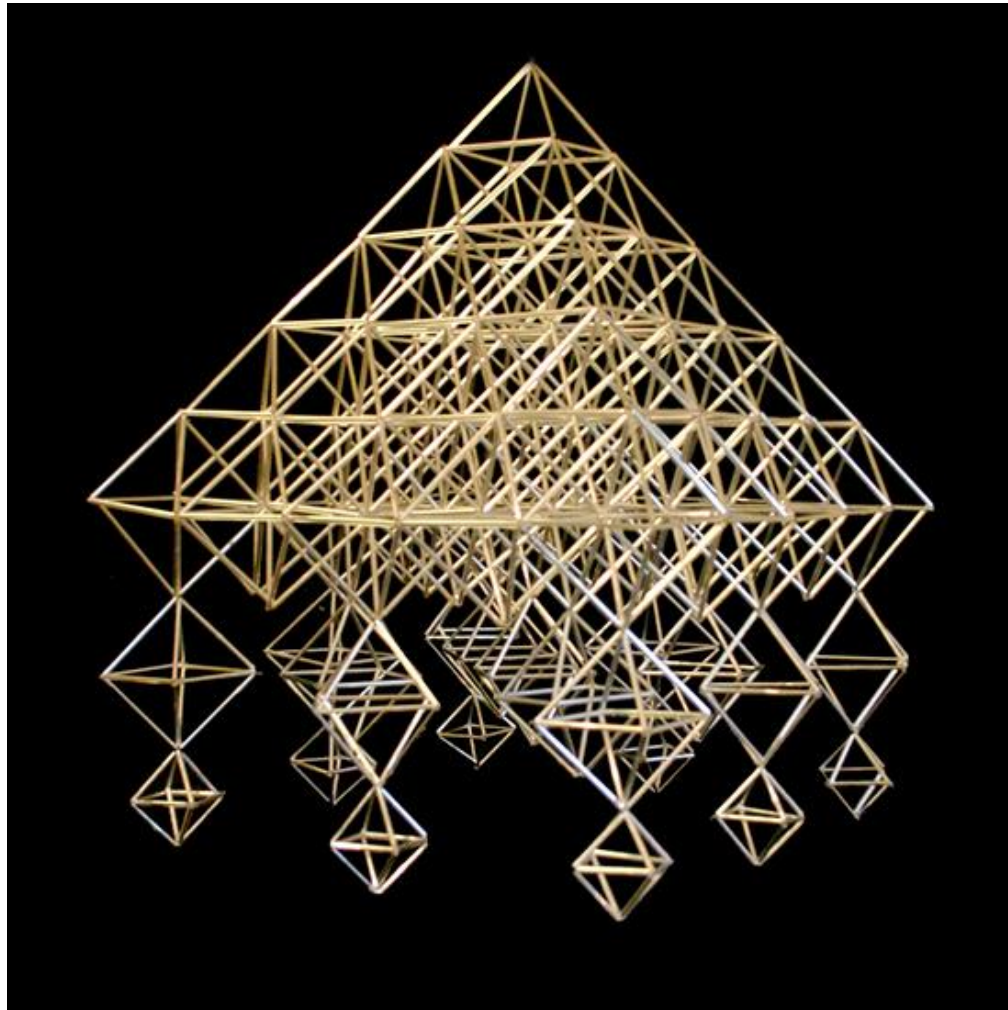
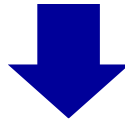
Bend, Cut & Connect!



Character : Infinite Expansion

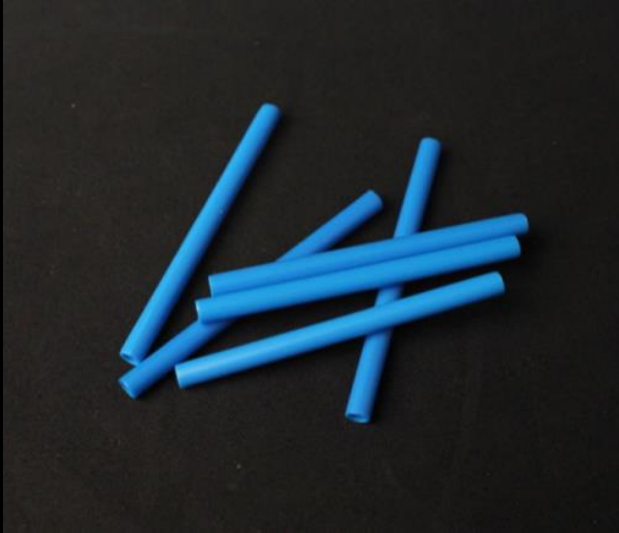


Character : Infinite Expansion



The traditional Nordic
christmas decoration:
the himmeli





Tubes



Connectors

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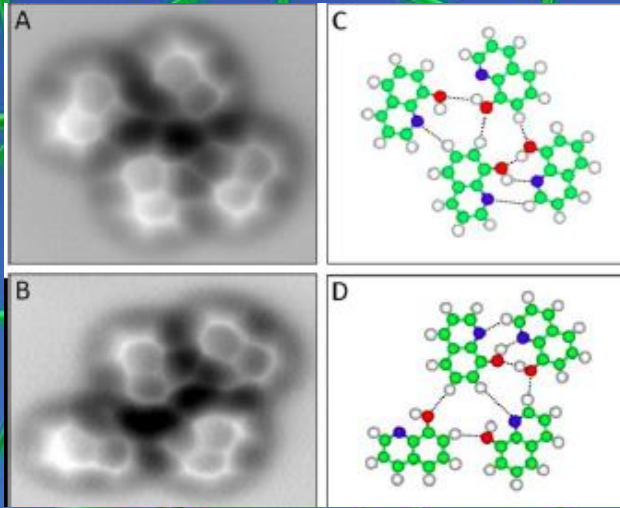
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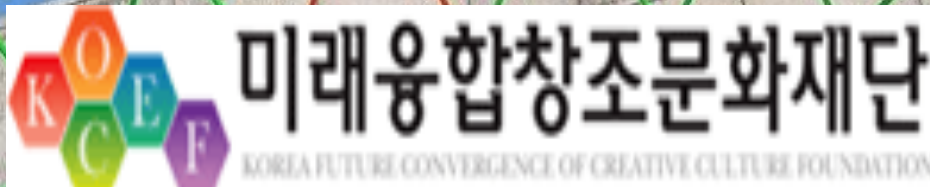


VISUALITY & MATHEMATICS

EXPERIENTIAL EDUCATION
OF MATHEMATICS THROUGH
VISUAL ARTS, SCIENCES
AND PLAYFUL ACTIVITIES



You can use 4Dframe to simply represent the water molecule (H_2O) and explore its features in different chemical structures.



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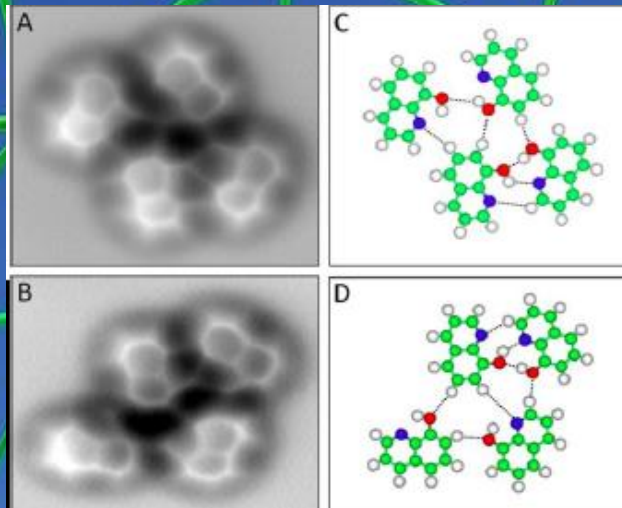
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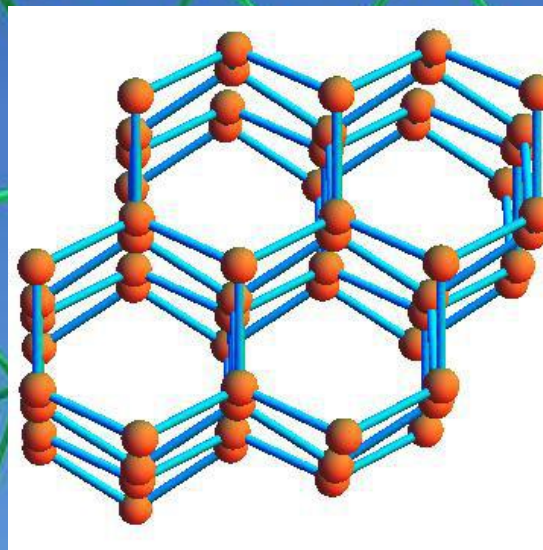


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....or you can show how the water's molecular structure look a like when it is freezing:

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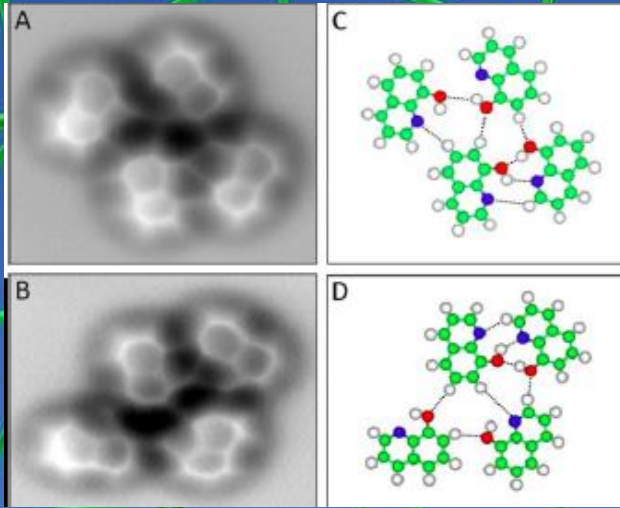
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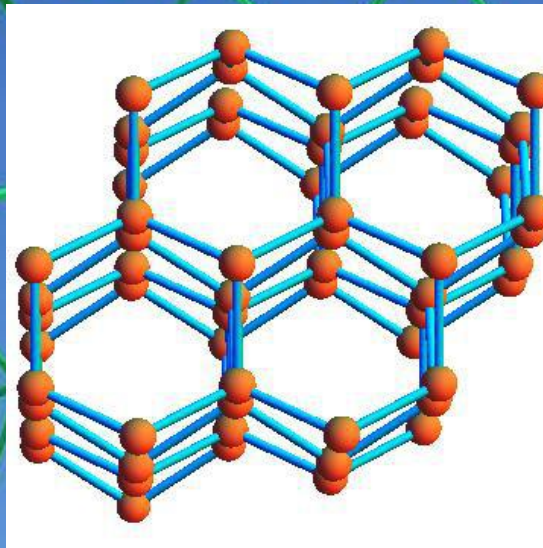


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....or you can show how the water's molecular structure look a like when it is freezing:

the water molecules in an ice crystal form themselves into a six-sided lattice...

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When we see a beautiful winter landscape, with white mountain tops and ski slopes, we know that **snow** has fallen. **But what is snow?**



미래융합창조문화재단

KOREA FUTURE CONVERGENCE OF CREATIVE CULTURE FOUNDATION

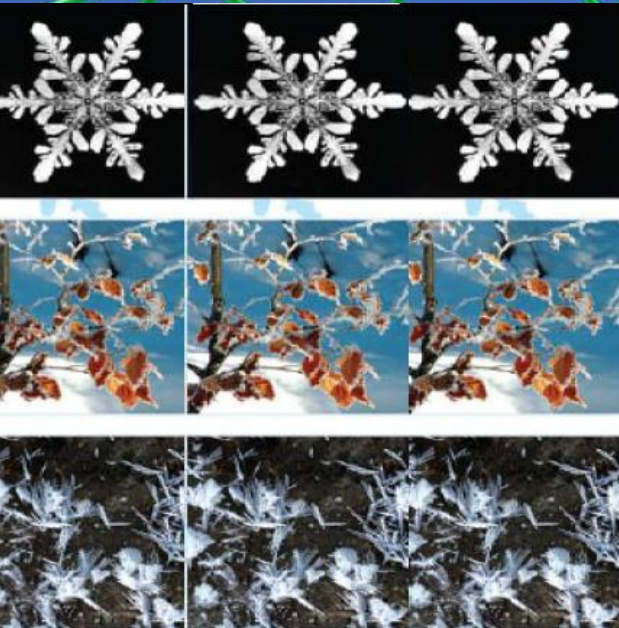
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*4D프레임
www.4dframe.com

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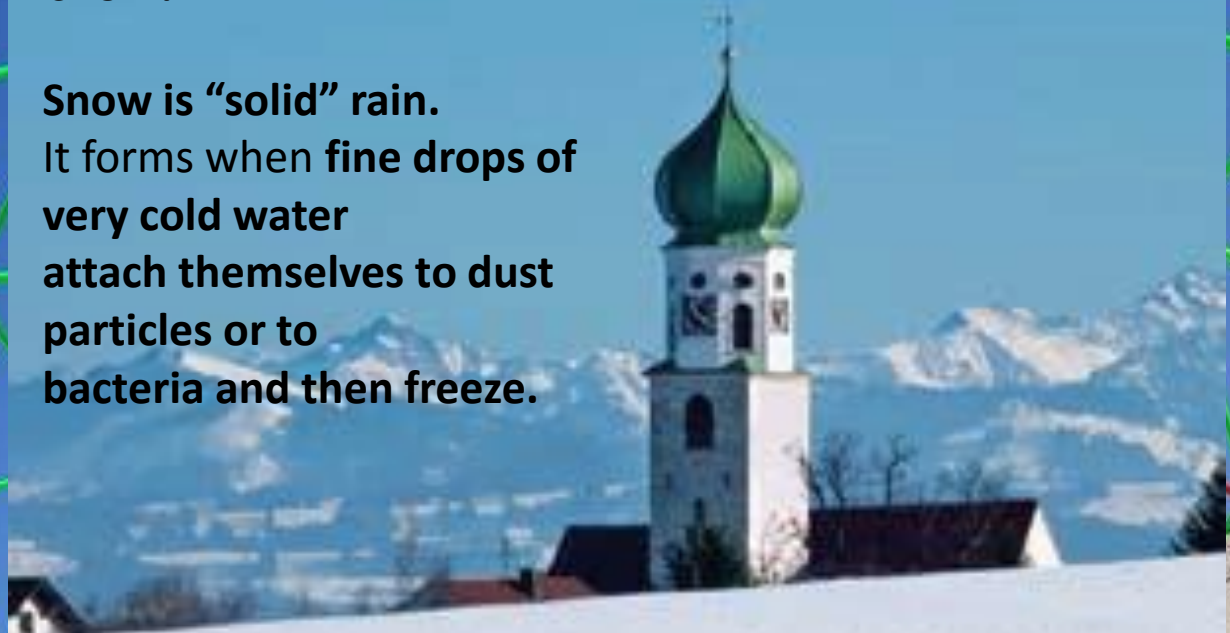
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When we see a beautiful winter landscape, with white mountain tops and ski slopes, we know that **snow** has fallen. **But what is snow?**

Snow is “solid” rain. It forms when **fine drops of very cold water attach themselves to dust particles or to bacteria and then freeze.**

This situation occurs **within clouds**, at or **below -12° Celcius.**

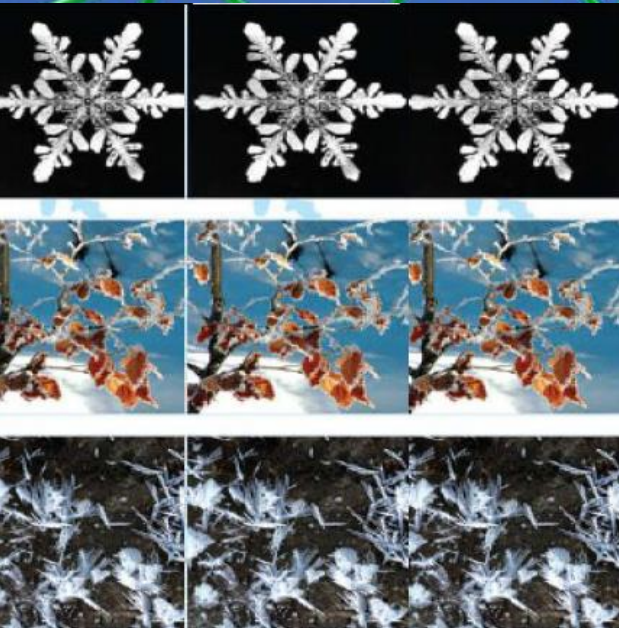


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The surrounding **temperature and humidity** influence how each **crystal** develops.

If it is **very cold**, with a **high level of humidity**, **six-sided hollow columns** will form.

If the weather is **warmer**, **six-sided stars** will appear.

Each and every crystal follows its own particular path on its way downwards and the tiniest fluctuations in temperature and humidity **will have an effect on its appearance.**

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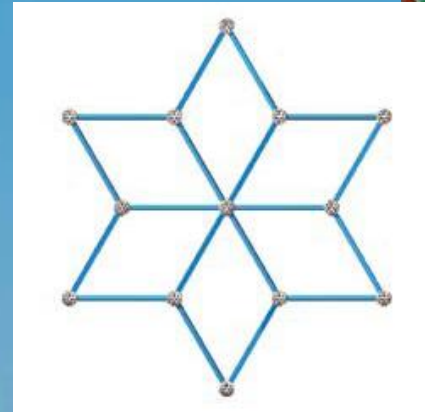
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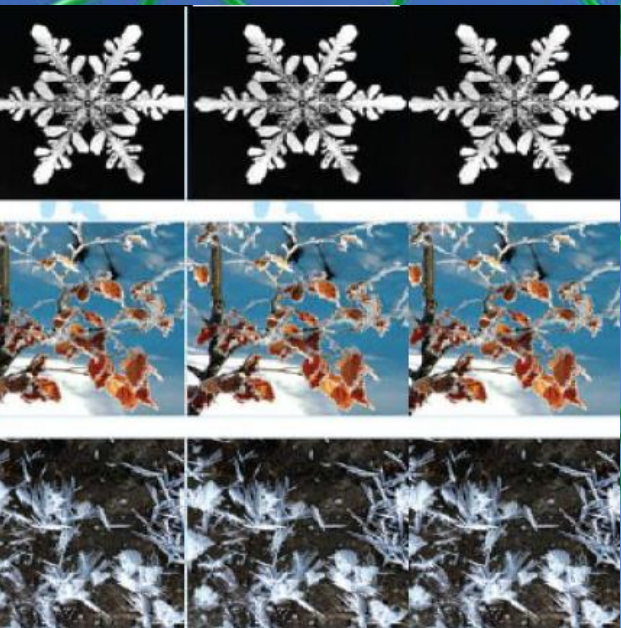


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Maybe your ice crystal will develop into a beautiful 3 dimensional star while falling down?



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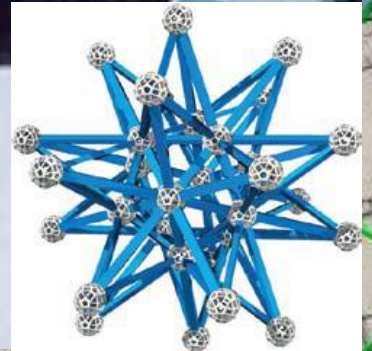


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Snowflake Bentley

The Official Web Site of Wilson A. Bentley (1865-1931)
"No Two Snowflakes Are Alike"

<http://www.snowflakebentley.com/>



The American Chemical Society Presents

THE CHEMISTRY OF SNOWFLAKES

<http://science360.gov/obj/video/39857f05-a4c6-4227-b0e8-719e2b437a72/chemistry-snowflakes>

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[초등6 과학] 날씨의 변화
[중등1 과학] 물질의 세가지 상태

NO : 4DS-034
특허 : 실용신안 제0379499호

신비로운 육각형 구조 눈 결정체

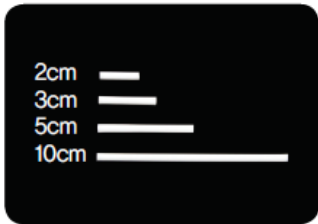
■ 재료 구성 : [연결봉] 2cm, 3cm, 5cm, 10cm [연결발] 2발, 3발, 6발

대한민국 발명체험교구
4D프레임
www.4dframe.com
(주)포디랜드 · 포디수리과학창의연구소
TEL. 070-4614-6704 Fax. 02-3437-1933

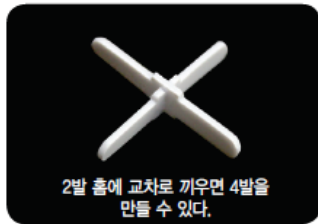
눈 결정체가 육각형인 이유는 무엇일까요?

물분자(H₂O)는 산소(O)와 수소(H)가 104.5도의 각도로 이루어져 있기 때문에 온도가 낮아져 얼어 붙게 되면 입체적인 육각형 구조가 되며 습도와 온도에 따라 결정체의 형태가 달라집니다.

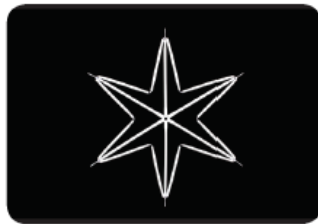
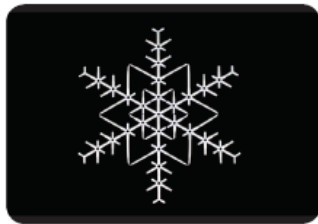
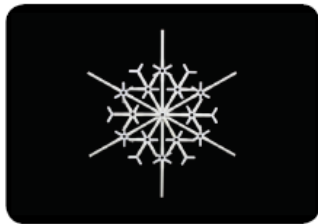
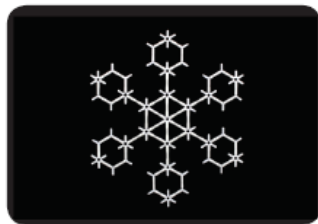
부품 구성



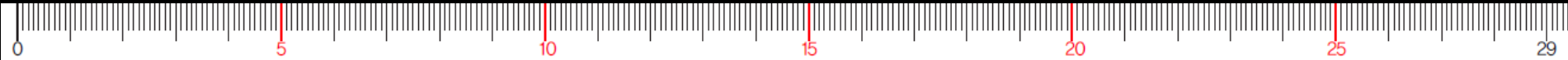
구멍이 여러



■ 여러 형태의 눈 결정체



Tip ① 연결봉에 연결발을 끼울 때 연결봉 끝을 살짝 눌러서 끼우면 보다 쉽게 들어갑니다. ② 연결발 중앙 구멍에 연결봉을 넣을 시 4D 로고가 없는 면으로 넣으면 쉽게 들어갑니다.



[초등6 과학] 날씨의 변화
[중등1 과학] 물질의 세가지 상태

신비로운 육각형 구조 눈 결정체

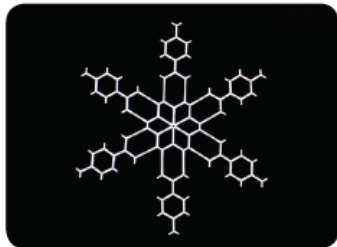
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